

SPECIFICATION AMENDMENTS

Please rewrite paragraph [0055] as follows:

[0055] Suitable fuel cell stack designs are well known. For example, the fuel cell systems taught in U.S. Pat. Nos. 5,858,569, 5,981,098, 5,998,054, 6,001,502, 6,071,635, 6,174,616, and ~~6,372,372 09/502,886~~ are each hereby incorporated by reference. In an integrated fuel cell system, the fuel cell stack may be associated with additional components and subsystems. A coolant system may be used to circulate a liquid coolant through the stack to maintain a desired operating temperature. A radiator or other heat transfer device may be placed in the coolant path to provide coolant temperature control. The coolant may also perform heat transfer in other areas of the system, such as in the fuel processor, or cooling reactants exiting the fuel processor to a desired temperature before entering the fuel cell stack. As an example, the coolant may be circulated by a variable speed pump.

Please rewrite paragraph [0057] as follows:

[0057] The reactant plumbing associated with the stack may be conducted in part by a manifold. For example, the teachings of U.S. Patent Ser. No. 6,541,148 09/703,249 are hereby incorporated by reference. Such a manifold may be further associated with a water collection tank that receives condensate from water traps in the system plumbing. The water tank may include a level sensor. Some fuel cell systems may require an external source of water during operation, and may thus include a connection to a municipal water source. A filter may be associated with the connection from the municipal water supply, such as a particulate filter, a reverse osmosis membrane, a deionization bed, etc.

Please rewrite paragraph [0059] as follows:

[0059] The spent fuel exhausted from the fuel cell stack may contain some amount of unreacted hydrogen or unreacted hydrocarbon or carbon monoxide from the fuel processor. Before the spent fuel is vented to the atmosphere, it may be sent through an oxidizer to reduce or remove such components. Suitable oxidizer designs are known, such as burner designs, and catalytic

oxidizers similar to automotive catalytic converters. Oxidizers may utilize air exhausted from the fuel cell stack, and may have an independent air source, such as from a blower. In some systems, the heat generated by the oxidizer may be used, for example, to generate steam for use in the fuel processor or to humidify the fuel cell reactants. Exemplary oxidizer designs are described in U.S. patent Ser. Nos. 6,370,878 09/727,921 and 6,551,733 09/728,227, which are each incorporated herein by reference. Fuel cell exhaust oxidizers are sometimes referred to as "tailgas oxidizers" or "anode tailgas oxidizers" ("ATO").

Please rewrite paragraph [0060] as follows:

[0060] Another system that may be associated with the fuel cell stack is a mechanism for measuring the voltages of the individual fuel cells within the stack. For example, the teachings of U.S. Pat. No. 6,140,820, Ser. Nos. 6,313,750 09/379,088, 6,410,176 09/629,548, 6,281,684 09/629,003 are each hereby incorporated by reference. In some systems, the health of a fuel cell stack may be determined by monitoring the individual differential terminal voltages (also referred to as cell voltages) of the fuel cells. Particular cell voltages may individually vary under load conditions and cell health over a range from -1 volt to +1 volt, as an example. The fuel cell stack typically may include a large number of fuel cells (between 50-100, for example), so that the terminal voltage across the entire stack is the sum of the individual fuel cell voltages at a given operating point. As the electrical load on the stack is increased, some "weak" cells may drop in voltage more quickly than others. Driving any particular cell to a low enough voltage under an electrical load can damage the cell, so systems may include a mechanism for coordinating the cell voltages with the electrical demand and reactant supply to the fuel cell stack. For example, the teachings of U.S. patent Ser. Nos. 6,697,745 09/749,261, 6,581,015 09/749,297 are hereby incorporated by reference.

Please rewrite paragraph [0061] as follows:

[0061] A fuel cell stack typically produces direct current at a voltage which varies according to the number of cells in the stack and the operating conditions of the cells. Applications for the

power generated by a fuel cell stack may demand constant voltage, or alternating current at a constant voltage and frequency similar to a municipal power grid, etc. Integrated fuel cell systems may therefore include a power conditioning system to accommodate such demands. Technologies for converting variable direct current voltages to constant or relatively constant voltages are well known, as are technologies for inverting direct currents to alternating currents. Suitable power conditioner topologies for fuel cells are also well known. For example, the teachings of U.S. patent Ser. No. 6,581,015 09/749,297 are hereby incorporated by reference.

Please rewrite paragraph [0067] as follows:

[0067] The spent reformatte is exhausted from fuel cell 312 via conduit 316 and is fed to oxidizer 318 to remove any carbon monoxide, hydrogen, or residual hydrocarbons in the exhaust. The oxidizer 318 is a catalytic oxidizer similar to an automotive catalytic converter. The oxidizer receives its oxygen via conduit 320, which channels the air exhausted from the fuel cell stack 312. In some embodiments, the oxidizer 318 can further receive a supplemental supply of oxygen to ensure adequate oxygen to oxidize combustibles in the fuel exhaust 316. In other embodiments, excess air stoich can be supplied to the fuel cell stack 312 to ensure that the cathode exhaust (at conduit 320) 320 has sufficient oxygen.

Please rewrite paragraph [0075] as follows:

[0075] Referring to FIG. 5, a schematic diagram is shown of another example of a CHP fuel cell system 500. A coolant is circulated between a fuel cell system 502 and a radiator 508 to maintain the operating temperatures (e.g., the coolant temperature) in the fuel cell system 502 at desired levels. The coolant flows from the fuel cell system 502 to the radiator 508 via conduit 504 and returns from the radiator 508 to the fuel cell system 502 via conduit 506. A blower 509 (not shown) is associated with the radiator 508 that is actuated to cool the coolant flowed through the radiator 508 by blowing a relatively cool fluid across the radiator 508. In this example, the blower is used to flow cold air from building 514 via conduit 512 across the radiator 508, where the air is heated and is then flowed back to building 514 via conduit 512. The blower 509 may be actuated, as an example, by a thermostat located in building 514. The radiator 508 may also

include a second blower to reject radiator heat to ambient to maintain a desired operating temperature of the fuel cell system 502 when heat is not required by the building 514. This example illustrates another means by which fuel cell system heat can be provided to a heat sink. It will be appreciated that while the heat sink in this example is generally the building 514, it could also be defined in terms of the radiator 508 as a matter of perspective.

Please rewrite paragraph [0078] as follows:

[0078] Suitable fuel cell stack designs are well known. For example, the fuel cell systems taught in U.S. Pat. Nos. 5,858,569, 5,981,098, 5,998,054, 6,001,502, 6,071,635, 6,174,616, and 6,372,372 ~~09/502,886~~ are each hereby incorporated by reference. A fuel cell stack may also be incorporated that is based on a "high temperature" PEM, such as the polybenzimidazole ("PBI") fuel cell membranes manufactured by Celanese. U.S. patents describing this material include U.S. Pat. Nos. 5,525,436, 6,099,988, 5,599,639, and 6,124,060, which are each incorporated herein by reference. In this context, "high temperature" PEM's generally refer to PEM's that are operated at temperatures over 100[deg.] C. (e.g., 150-200[deg.] C.). Stacks based on other high temperature membrane materials such as polyether ether ketone ("PEEK") may also be suitable.

Please rewrite paragraph [0101] as follows:

[0101] In another embodiment, the heat sink receives at least a portion of its heat from the fuel cell stack (e.g., from a coolant circulated through the stack and contacted with the heat sink). In this embodiment, the system responds to a heat demand signal (e.g., from a thermostat on a hot water heater) by shorting at least one fuel cell within the fuel cell stack. ~~For example, the teachings of U.S. patent Ser. No. 09/428,714 are hereby incorporated by reference.~~ When a fuel cell is shorted, its electrical potential is driven to zero and all power generated in the cell is in the form of heat. Essentially, the shorted cell is converted into a resistive heater. In this way, additional heat can be supplied by the fuel cell system for a given power output of the fuel cell stack.

Please rewrite paragraph [0104] as follows:

[0104] Such a control scheme may also include a step where the operating conditions of the un-shorted cells are adapted to optimize the current density and/or voltage of the un-shorted cells. For example, it is well understood in the art that a fuel cell voltage and current density can be manipulated according to the electrical load on the cell and the reactant conditions and stoichiometry provided. For example, the teachings of U.S. patent Ser. No. 09/471,759 (now abandoned referenced above) include the use of a battery system coupled with a dynamic current limiting device to supply constant power to an electrical load while controlling the portion of the load that is placed on the fuel cell stack.